

The rootlets are not formed till afterwards upon the outside of it. Another proof that the *Lycopodia* cannot be said to have a main-root.

4. *The terminal bud becomes inclosed by an envelope (two bud-envelopes, Knospenhüllblättern).* These remind us of the cotyledons of the Dicotyledons. At all events those bud-envelopes are identical with it, which so often occur in the Phanerogamia, e. g. in many *Leguminosæ*, as in *Amicia*, *Lathyrus*, *Pisum*, in *Agri-monia*, in *Cunonia capensis*, especially, exactly as in *Selaginella denticulata*, in the Begonias, &c. Here these enveloping leaves have usually been looked upon as stipules. It is impossible that they can be such; for they are distinguished from true stipules, e. g. in Roses by the fact that they always inclose axial buds, and always surrounding the stem at the origin of the internode, they persist or drop off (*Cunonia*), while the stipules, mere appendicular organs, rest upon the leaves. This is alluded to in another place.

5. *The Selaginellæ possess a main-axis.* This however remains very short and divides at once in the terminal bud into two branches, which in like manner always divide again dichotomously. Hence the "caulis dichotomo-procumbens."

6. *The leaf is merely an "outshoot" (Auftriebung) of the stem, which expands into a flattened body.*

7. *In Selaginella denticulata an accessory organ also is found between the axis and the leaf; the import of this is as yet doubtful.* In more recent researches in living *Selaginellæ* I found it also in *Selaginella stellata*, *opus* and *viticulosa*, and of exactly the same structure. It thus becomes probable that it extends throughout the whole of the genus *Selaginella*.

8. Among the significant peculiarities in *Selaginella* is also to be included the extremely regular position of the branch-roots. I mentioned above that they are formed upon the upper side of the stem in *Selag. denticulata*, and that Schleiden, without referring to the species, says that he has observed them on the under side. Since this was printed I have become acquainted with several living *Selaginellæ* in the Berlin Botanic Garden, and I found in one of them, in *Selag. stellata*, Spr., a confirmation of Schleiden's assertion. I thus had an opportunity to seek for the law which prevails here. It proves to be as follows: the roots of the branches make their appearance both on the upper and under side of the stem, but always just inferior to the forked division of a branch, and indeed within its last leaf. If this be on the upper side—and then it is a folium intermedium—there, also, the branch-root appears. But if the leaf be on the under side—and it is then a larger leaf—the branch-root also is formed on the under side always between the stem and leaf, consequently as a true branch.

9. *The oophoridium in Selaginella denticulata, and all those Selaginellæ where it stands at the base of the spike, is always a metamorphosed main-branch.* This is the case in *Selag. ferruminata*, Sprg. (= *elongata*, Klotzsch), *lucidinervia*, Sprg. (= *pedata*, Kl.), *conduplicata*, ej., *distorta*, ej., *Poppigiana*, ej., *sulcata*, ej., *stolonifera*, ej., *deliquescens*, ej., *puberula*, Kl., *lævigata*, Sprg., *articulata*, &c. Whether this law may be modified in those species where antheridia and oophoridia occur on one spike, whether it is here a transformed *secondary* branch, *e. g.* in *S. stellata*, Sprg., *pygmæa*, ej., *helvetica*, ej., &c., yet remains to be investigated. In other *Selaginellæ*, the fruit of which is diœcious, where therefore oophoridia and antheridia occur on distinct spikes, the oophoridium appears to be a metamorphosed main-branch, *e. g.* in *S. selaginoides*—certain it is however that the oophoridium is never a leaf-product.

*The oophoridium-spores, more properly the ovules, are formed at the extremity of the vascular bundle which projects free into the interior of the oophoridium as a hollow mother-cell.* The course of its development still requires to be more minutely investigated.

10. *The antheridium is a metamorphosed twig-bud\* (Zweigknospe) developed simultaneously with the leaves from the axis, a twig here being understood to be a secondary branch.* The antheridium is never a leaf-product. Here refer also the sporangium of *Psilotum* and *Tmesipteris*.

*The antheridium-spores originate by fours in a mother-cell, and certainly by cytoblast-formation as understood by Schleiden (formation of a membrane around a nucleus), never by division of the cytoblastema.*

#### EXPLANATION OF PLATES II. TO VI.

##### PLATE II.

- Fig. 1.* The germinating spore: *a*, the rootlet; *b*, the terminal bud; *c*, the germ. 250 †.
- Fig. 2.* The terminal bud so seen that the other branch-bud lies behind the one *a*. 250.
- Fig. 3.* The same, unfolded artificially. 250.
- Fig. 4.* The whole germinating plant, removed from the spore: *a*, the point of vegetation for the stem and root; *b*, the germ (*Keim-körper*). 50.
- Fig. 5.* The germinating plant with the bud-leaves. 10.
- Fig. 6.* A bud-enveloping leaf, with a branch-bud *a*; *b*, an accessory organ. 250.
- Fig. 7.* The base of the bud-envelope. 400.

\* The word *Zweigknospe*, literally twig-bud, is here used in distinction to *Astknospe* or branch-bud, which latter may be regarded as determining the bifurcation of the main axis, while the former is a secondary ramification.—TR.

† The figures give the magnifying power.